

REMARKS

In an Office Action dated March 14, 2003, the Examiner rejects all pending claims 1-20 on prior art grounds in view of various combinations of U.S. Patent Nos. 4801477, 4929402, 5593531, and 6051179 to Fudim, Hull, Penn, and Hagenau, respectively.

Applicant notes that the present rejection is issued subsequent to the Examiner's indication of the allowability of all the claims over the primary reference, Fudim. Nonetheless, Applicant replies to the outstanding Action by amending claims 1, 6, 11-14, and 17, canceling claim 19, and submitting the present remarks. Consideration hereof and allowance of the application are now respectfully requested.

Claims 1, 2, 5, 7, 8, 10, 11, and 15-17 are rejected under 35 U.S.C. §102(b) as being anticipated by Fudim. In reply, Applicant submits that this rejection is improper and may not be maintained because each and every limitation of the presently amended claim 1 is not taught by the relied upon reference.

Claim 1, as amended, recites a rapid prototyping apparatus comprising, *inter alia*, at least one light source for illumination of a cross section of a light-sensitive material by at least two spatial light modulators of individually controllable light modulators, and a plurality of light guides optically coupled to the light source and arranged with respect to the spatial light modulator arrangement in such a manner that each light guide illuminates a sub-area of the cross section. That is, present claim 1 recites a *plurality* of spatial light modulators coordinating with the light guides to illuminate specific sub-areas of the cross-section of the light sensitive material. Further, the spatial light modulators each include *individually controllable* light modulators. At least these elements are not taught or in anyway disclosed by Fudim. Thus, claim 1, and claims 2-14, depending therefrom are novel over Fudim.

One exemplary embodiment of Applicant's invention is shown in Figure 1 and includes a container 1 for holding a liquid rapid prototyping material (RP), a rack 5 mounted movably thereon, a light source 6 supported by the rack 5 from which bundles of optical fibers 7 extend and connect to a plurality of light guides 8 which, in turn, connect to the at least two spatial light modulators contained within an illumination device 9. In one embodiment, each of the plurality of spatial light modulators comprises a number of individually controllable light modulators, such as, for example, micromechanical valves and/or shutters which are individually electrically controllable by connected control circuitry.

That is, the invention employs an optical network to distribute input light from a light source to multiple spatial light modulator arrangements, each arrangement comprising individually controllable light modulators which then output specific modulated light to certain areas of the surface of the material, as desired.

Turning now to Fudim, the reference is generally directed to a method and apparatus for making three-dimensional objects by photosolidification of photopolymers. Such apparatus is shown in Figure 4 of the patent and is specifically referred and relied upon by the Examiner in the outstanding Office Action.

Figure 4 of Fudim illustrates a container 10 for holding an uncured polymer 11, a substrate 12 disposed in the container 10, and a guide 13 located in the polymer 11 above the substrate 12. The guide 13 contains a fused bundle of optical fibers 14. The guide 13 is sealed at a lower surface by a radiation emitting surface 15 and at an upper surface by a changeable mask or aperture 20. The mask or aperture 20 includes different areas of opacities. Finally, a radiation source 18 which emits light is disposed above the mask or aperture 20.

In use, the Fudim device emits light from the radiation source 18 incident upon the mask or aperture 20 which varies the opacity thereof, thus modulating the light. Then, the modulated light radiates upon the bundle of optical fibers in the guide 13 and is delivered therethrough to the radiating surface 15 and emitted therefrom into the uncured polymer 11 of the container 10.

That is, Fudim teaches only a single light modulator 20. There is no disclosure of a plurality of light modulators, as recited in Applicant's claim 1. Further, Fudim's single light modulator 20 clearly does not comprise a plurality of individually controllable light modulators as also recited in Applicant's claim 1. Fudim is inarguably directed to a device with a single modulator 20 including fixed areas of various opacities. Modulation of light by Fudim may only be varied by replacing the entire mask/aperture 20.

This teaching of Fudim is quite contrary to Applicant's recitation in claim 1. Accordingly, in that Fudim fails to teach all of the recited limitations, claim 1 is novel over Fudim. Reconsideration and withdrawal of the outstanding novelty rejection of claim 1 is respectfully requested. Since claim 1 is not further rejected, claim 1 is now in condition for allowance.

Claims 2-14 and 18-20 variously depend upon allowable claim 1. Thus, claims 2-14 include all of the limitations of claim 1 and additional limitations. Accordingly, claims 2-14 are now allowable to Applicant. Reconsideration and withdrawal of all outstanding rejections of claims 2-14 and 18-20 is respectfully requested.

Claim 15 is rejected under 35 U.S.C. §102(b) as being anticipated by Fudim. Here again, Applicant submits that the rejection is improper and may not be maintained because the reference in fact fails to teach each and every limitation of the rejected claim.

Claim 15 recites a method of manufacturing a three dimensional object comprising, *inter alia*, at least one light source illuminating a cross section of a light-sensitive material by at least two modulator arrangements of individually controllable light modulators.

As discussed above with reference to claim 1, Fudim does not teach a plurality of light modulator arrangements nor does the reference teach such arrangements as being composed of individually controllable light modulators.

Thus, Fudim does not teach all of the limitations of claim 15. Accordingly, claim 15 is novel over Fudim. Reconsideration and withdrawal of the outstanding novelty rejection of claim 15 is respectfully requested. Since claim 15 is not further rejected, claim 15 is now in condition for allowance.

Claims 16-17 each depend from allowable claim 15. Thus, claims 16-17 include all of the limitations of claim 15 and additional limitations. Accordingly, claims 16-17 are allowable. Reconsideration and withdrawal of all rejections of claims 16-17 is respectfully requested.

Claim 21 is newly added and includes no new matter as antecedent support is found throughout the original specification, claims, and drawings.

Claim 21 recites the rapid prototyping apparatus of claim 1, wherein the plurality of light guides is disposed between the light source and the spatial light modulators. This embodiment of the invention is shown in an exemplary configuration in Figure 1 where light guides (i.e., fibers 7/8) are disposed between the light source 6 and the spatial light modulators (i.e., the illumination device 9).

The references, particularly Fudim, fail to teach or suggest this limitation as recited in claim 21. Accordingly, claim 21 is allowable over the references. Consideration and allowance of claim 21 is respectfully requested.

Claim 22 is newly added and includes no new matter as antecedent support is found throughout the original specification, claims, and drawings.

Claim 22 recites the limitations of original claim 1 and claim 21. As discussed above, the references at least fail to teach or suggest the limitations of claim 21. Accordingly, new claim 22, which includes the provisions of claim 21, is allowable. Consideration and allowance of claim 22 is respectfully requested.

Pending claims 1-22 are allowable over the cited and relied upon references for at least the reasons set forth herein.

The present Amendment does not contain any new matter as support is found through the originally filed specification and claims. Thus, entry of the Amendment and prompt allowance of the application are respectfully requested.

The Examiner is invited to contact Applicant's attorney at the below-listed phone number regarding this Response or otherwise concerning the present application. If there are any charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorneys.

Respectfully submitted,
CANTOR COLBURN LLP

By: 

Daniel F. Drexler

Registration No. 47,535

CANTOR COLBURN LLP

55 Griffin Road South

Bloomfield, CT 06002

Telephone: 860-286-2929

Facsimile: 860-286-0115

Customer No. 23413



23413

PATENT TRADEMARK OFFICE

Date: August 25, 2003